US Army Corps of Engineers®
Engineer Research and Development Center

Site Characterization and Analysis Penetrometer System (SCAPS)

Description

ERDC has designed technologies that led to the development of the Site Characterization and Analysis Penetrometer System (SCAPS) Research and Development Program. The SCAPS R&D program has assembled, under one umbrella, a mobile 20-ton platform (hydraulic cone penetrometer truck) and a suite of cost-effective sensing and sampling technologies that rapidly detect, discriminate, and quantify a wide variety of contaminants. SCAPS technologies detect contaminants in both soil and groundwater in situ while simultaneously determining subsurface geophysical characteristics. ERDC has transitioned SCAPS units to three U.S. Army Corps of Engineers Districts (Kansas City, Savannah, and Tulsa Districts) that conduct operational site characterization at government installations. The three Corps Districts operating SCAPS units have been assigned Areas of Responsibility (AOR) by geographic regions and coordinate SCAPS work within their respective AOR. Information pertaining to AOR assignments, points of contact, and scheduling SCAPS work may be obtained at: http://www.environmental.usace.army.mil/info/technical/geotech/geotopical/Appendix_A_tech_edit_final.doc

Capabilities

SCAPS provides onsite engineers with a rapid and cost-effective means to sense and sample soil and water contaminants at Department of Defense facilities undergoing installation restoration (cleanup). SCAPS also provides onsite real-time data acquisition and processing, as well as 3-D visualization of areas of potential contamination. For information pertaining to SCAPS technology development and capabilities, contact Mr. John Ballard, 601-634-2446, John.H.Ballard@usace.army.mil.

Supporting Technology

- SCAPS laser-induced fluorescence (LIF) petroleum, oil, and lubricant (POL) Sensor System: detects fluorescing petroleum, oil, and lubricant contaminants in soil or groundwater. (This is a regulatory approved certified technology.)
- SCAPS Thermal Desorption Sampler (TDS): a hybrid sensor/sampler technology designed to provide near real-time detection of volatile organic compounds in the soil vadose zone. (This is a regulatory approved certified technology.)
- SCAPS Hydrosparge Volatile Organic Compounds (VOC) sampler/ Ion Trap Mass Spectrometer (ITMS) system: uses a commercially developed, small-diameter groundwater sampler interfaced to a direct sparging ITMS to detect VOC contaminants in groundwater. (This is a regulatory approved certified technology.)

- SCAPS Explosives Sampler: an electrochemical sensor system designed to detect nitrogen-based explosives compounds (TNT, RDX, HMX) in near real-time in subsurface media in situ.

SCAPS Enhanced Spectral Gamma Sensor: detects gamma-emitting radionuclides in soil, groundwater, and mixed tank wastes in situ. A joint ERDC/Department of Energy technology verification demonstration has been successfully completed.

Benefits

- SCAPS reduces the time and cost of site characterization and restoration monitoring by providing rapid onsite real-time data acquisition/processing (i.e., in situ sample analysis) and onsite three-dimensional visualization of subsurface soil stratigraphy and regions of potential contamination.

- SCAPS is a relatively non-intrusive operation that produces a minimal environmental impact.

- SCAPS prevents cross-layer contamination by grouting through the penetrometer probe during rod retraction.

- SCAPS can determine locations that are free of contamination. This results in cost savings because the number of conventional monitoring wells, samples, and analytical laboratory tests required to characterize and monitor cleanup activities is reduced.

As regulatory acceptance of emerging SCAPS sensor and sampler technologies has been obtained, site characterization and monitoring expenditures have been greatly reduced.

Success Stories

- The SCAPS LIF POL Sensor System documented savings of $1 million at the Point Loma Fleet Industrial Supply Center Fuel Farm, California, by determining areas free of contamination that were scheduled for excavation and remediation. The reduction in soil volume requiring excavation and remediation was verified by conventional sampling methods.

- The SCAPS Hydrosparge VOC Sampler/ITMS System documented savings exceeding $300,000 over conventional well sampling technologies at the Bush River Site, Aberdeen Proving Ground, Maryland. The SCAPS Hydrosparge VOC Analysis System provided near real-time analytical results from 30 mini-well locations in 8.5 days versus 155 days to install, sample, and conduct offsite laboratory analyses from 30 conventional monitoring wells.

The SCAPS Enhanced Spectral Gamma Sensor System provided documented savings exceeding $800,000 for site characterization work at the R-Reactor Seepage Basin, Savannah River Site, South Carolina, versus 180 conventional radiological sampling events.

Point of Contact

John Ballard, 601-634-2446, John.H.Ballard@usace.army.mil